

Final Report

Phase II Research Findings: Tropical Cyclone Storm Surge Product Assessment and Exploration of Communication Needs for Extratropical and Post-Tropical Storms

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Arlington, Virginia**



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Eastern Research Group, Inc. (ERG)

ERG provides environmental, social science, and engineering solutions to climate, weather, and coastal management issues. Learn more at www.erg.com.

NOAA's Office for Coastal Management "Coastal management" is the term used by communities and organizations striving to keep the nation's coasts safe from storms, rich in natural resources, and economically strong. The national lead for these efforts is NOAA's Office for Coastal Management, an organization devoted to partnerships, science, and good policy. This agency, housed within the National Ocean Service, oversees major initiatives that include the National Coastal Zone Management Program, Coral Reef Conservation Program, Digital Coast, and National Estuarine Research Reserve System.

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Phase II Research Findings: Tropical Cyclone Storm Surge Product Assessment and Exploration of Communication Needs for Extratropical and Post-Tropical Storms – EXECUTIVE SUMMARY

In November of 2016, Eastern Research Group, Inc. (ERG) conducted interviews with 19 individuals in Florida, Virginia, and New Jersey following Tropical Storm/Hurricane Hermine, which made landfall on September 2, 2016, in the Big Bend area just east of St. Marks, Florida. The interviewees were identified by the National Hurricane Center (NHC) or National Weather Service (NWS) Weather Forecast Offices (WFOs) and included four media representatives and 11 representatives from the emergency management community. ERG also interviewed four forecasters in affected WFOs.

This research explored the awareness and use of the NHC Potential Storm Surge Flooding map, as well as awareness and communication around the experimental storm surge watch/warning (and prototype map) during the Hermine event. The research focused on the potential effects of these products on risk perception, emergency preparedness, and decision-making. Additionally, the work considered partners' communication needs related to storm surge threats from extratropical (ET) and post-tropical (PT) storms.

The research revealed the following:

- A high level of awareness and strong support of the Potential Storm Surge Flooding map.
- Strong support for the experimental storm surge watch/warning, as well as for the map component.
- A high rate of use and sharing of both maps in high-impact areas and by users more familiar with the products.
- A need for continued outreach and education to build understanding, familiarity, and trust with the products.
- Universal support for the NHC to continue issuance of tropical storm and hurricane watches/warnings and other tropical products (public advisories, maps, etc.) after a storm technically transitions from tropical status.
- A perceived information gap for communicating tidal and surge threats with ET storms.
- Strong support for the NWS to provide storm surge products (i.e., watch/warning and potential flooding maps) for ET storms, similar to the suite of products that have been developed for tropical cyclones.

It also should be noted that this work was exploratory in nature, focused solely on a small group of NWS partners in a limited geographic area, and did not assess how the public may interpret and use these products.

Phase II Research Findings: Tropical Cyclone Storm Surge Product Assessment and Exploration of Communication Needs for Extratropical and Post-Tropical Storms – FULL REPORT

Background

Hermine was a hurricane when it made landfall on September 2, 2016, in the Big Bend area just east of St. Marks, Florida.¹ During the storm, NOAA’s National Hurricane Center (NHC) issued the Potential Storm Surge Flooding map (highlighting areas of potential storm surge inundation). Hermine was also the first event for which the National Hurricane Center (NHC) issued the experimental storm surge watch/warning prototype graphic. The storm also presented another opportunity for the NHC to utilize new policy guidelines regarding the continued issuance of tropical storm and hurricane watches/warnings and other tropical products (public advisories, maps, etc.) after a storm technically transitions from tropical status.

Research Goals

This research explored the awareness and use of the Potential Storm Surge Flooding map, as well as awareness and communication around the experimental storm surge watch/warning during the Hermine event. The research focused on the potential effects of these products on risk perception, emergency preparedness, and decision-making. Additionally, the work considered partners’ communication needs related to storm surge threats from extratropical (ET) and post-tropical (PT) storms.

Sample

In November of 2016, ERG conducted interviews with 19 individuals (see Table 1), including forecasters from NWS Weather Forecast Offices (WFOs), emergency managers (EMs) and broadcast meteorologists in Florida, New Jersey, and Virginia identified by the NWS as having been involved in the Hermine response. The locations were as follows:

- Coastal counties in Florida, including Hernando, Levy, Taylor, and Wakulla, where Hermine produced considerable storm surge.
- Coastal counties (Cape May, Atlantic, and Ocean) in New Jersey. These locations had storm surge warnings and the inundation map, but the storm ended up moving farther offshore, reducing impacts.
- Virginia Beach and Norfolk, VA: These locations had warnings and the map, and did have surge. These locations were also affected by three back-to-back storms (Hermine, Julia, and Matthew). Julia was absorbed by a front, which caused significant rainfall in the Hampton Roads area.

Region	WFO	Federal (FEMA)	State EM	County/Local EM	Media	Total
Florida	2			4	1	7
New Jersey	1			3	1	5
Virginia	1		1	2	1	5
National		1			1	2
TOTAL	4	1	1	9	4	19

Table 1. Breakdown of interviewees sample

ERG began by conducting interviews with the appropriate WFOs (Tampa and Tallahassee, Florida, Mt. Holly, New Jersey, and Wakefield, Virginia) to help identify appropriate participants, get background on the storm(s), and learn how WFOs used/shared the storm surge products. Interviews were conducted via a webinar format with EMs and media representatives in the affected areas. While the interviews focused largely on Hermine, some participants did also share their experiences

¹ http://www.srh.noaa.gov/tlh/?n=hurricane_hermine2016

with prior and subsequent storms as well. (See Appendix A for the interview script, Appendix B for a summary of social media analysis conducted on relevant storm surge tweets during Hermine, and Appendix C for detailed tables summarizing interviewees' comments.)

Potential Storm Surge Flooding Map Research Findings

ERG explored awareness and use of the NHC Potential Storm Surge Flooding map with interviewees during Hermine, probing for any communication issues or challenges they encountered in using the map, as well as any feedback they received on the product.

Key Findings

- **Awareness.** There was a very high level of awareness of the map among the interviewees. In fact, all but one of the 19 interviewees saw the Potential Storm Surge Flooding map during Hermine.
- **Visual Component.** Several interviewees praised the visual aspect of the map, which they thought was particularly important for public messaging.
- **Use and Sharing.** The map was widely used and shared by media partners, as well as the FEMA representative and EMs in Florida (where the storm surge threat was greatest). Some interviewees (particularly in Virginia and New Jersey) expressed that while they saw the map, they did not share it—either because the storm no longer posed a threat in their area or because the map was still new for them. Several stated they were confident the map would be a useful tool for future storms.

Sample comments included:

- *Having this map is huge because it is a tool to visually highlight the threats and put a focus on storm surge—not just wind categories.* (New Jersey broadcast meteorologist)
- *We cannot have enough tools in our toolbox to communicate to the public so I think this is a good idea—*Florida EM.
- *I'm excited about it. The amount of clarity, detail that I know is coming, provides so much more value to us in EOC vs. what we've had with SLOSH and other products we've used. I'm going to do my part to make sure I'm fully trained. This is exactly what we need.* (Virginia EM)
- *[The map is] still a new thing here; more education is needed.* (New Jersey NWS forecaster)
- *Now that we know it's available, we can definitely use it for planning and educating. We can push out the information to the local municipal coordinators who then communicate/educate their local contacts.* (New Jersey EM)
- *I looked at it, but did not use it. By the time we got to a point where we would have used it, the storm drifted away from us. But it's a good product.* (New Jersey EM)

Other Findings

- **Reliability.** Most interviewees felt the levels on the map appeared realistic, though a few thought the levels were too high or too low for their area.
 - A few interviewees pointed out an initial discrepancy between the map and the forecast for Hermine, with the levels on the Potential Storm Surge Flooding map appearing low. While two stated that the issue appeared to resolve with later updates, one felt the problem continued, although he acknowledged this “probably happened because the track changed.”
 - One EM in Virginia and one in New Jersey said they did not share the map because the values appeared too high.
 - One Florida WFO forecaster also thought the levels were high (especially for Matthew) based on past experience and opted not to share the map in briefings.

- The other Florida WFO forecaster felt the levels depicted on the map at the 10-percent exceedance were too low.
- **Above Ground Level (AGL).** There were mixed opinions about whether the “above ground” expression of water levels on the map was confusing to NWS partners and the public. Some interviewees suggested that although there was some confusion, it was abating compared to when the map was first introduced. Several interviewees stated that expressing water levels using AGL made sense when communicating information to the public. Several felt that more education was necessary, particularly since so many EMs are used to Mean Low Water (MLW) and Mean Lower Low Water (MLLW) levels.
- **Exceedance.** Some media interviewees expressed difficulty with trying to explain the 10-percent exceedance used to generate the map and instead preferred to frame the map as a “worst-case scenario.” Some interviewees also stated that because the map looks deterministic and because the exceedance explanation is provided in small type on the map, the probability basis may be lost on people. (One stated, “The map should clearly say that is what could happen, NOT what is expected.” This sentiment was echoed by one WFO who said, “The map could easily be misinterpreted if people don't take the time to read the small print. The small print is SMALL (see Figure 2) and maybe should be more obviously stated that this is the reasonable worst-case scenario and that the condition will not be this bad nine out of 10 times.” One WFO also mentioned that it ended up having to issue multiple products at different exceedance levels and this resulted in some confusion among partners.

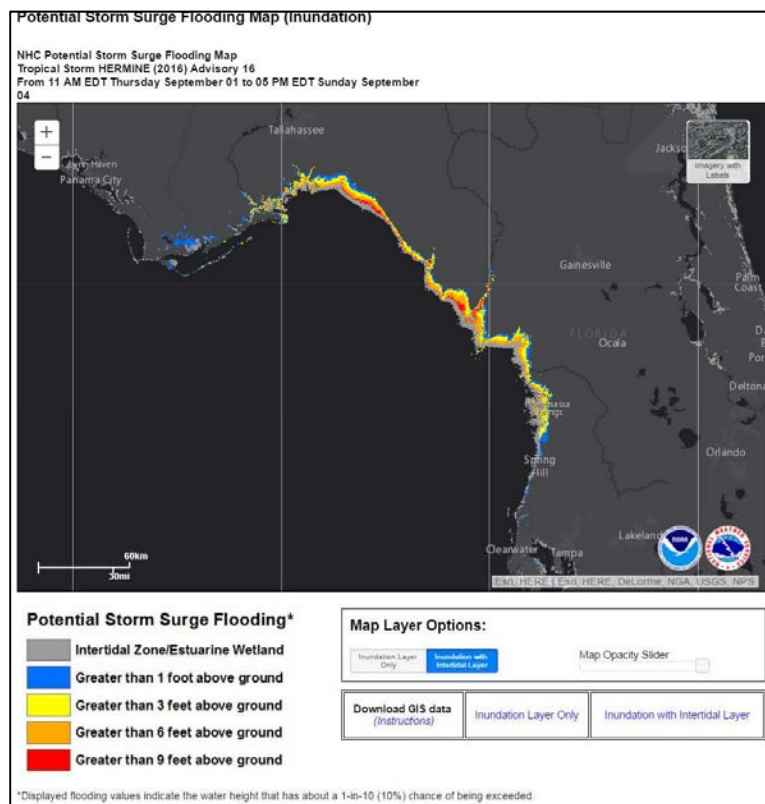


Figure 2. One of the Potential Storm Surge Flooding maps issued during *Hermine*

- **Level of Detail.** Several EMs stated the map does not capture the level of local detail they need to make decisions on the ground, not just during the event, but ahead of the event. These decisions include positioning staff and resources, planning evacuations, and opening shelters. For this reason, they said the storm surge flooding map would be more useful if they could zoom in for more detailed information.
- **Design.** The media interviewees stated that while the map works well on the web and on social media, it is too grainy and the text is too small for television. One said that he had to manually build the map in his software and that because the text is not dynamic, the labels shifted in his software. This same interviewee also felt the “intertidal zone” layer was confusing: “I like that it’s grayed out, but the fact that you have the option of unchecking it/turning off the toggle results in a higher surge level that gave a perception that the surge threat was higher.”
- **Increments of Water Levels.** Two EMs (one in Florida and one in Virginia) mentioned they would an additional level between 1 and 3 feet. One stated: “I think we would be better served if we keep this map but give the decision makers the ability to adjust or add levels based on local threat levels. The 3-foot level is a just a broad-brush approach that does not account for local nuances.” The other said: “The difference between 1 foot and 3 feet in our city is massive. The gap is too significant.”

Key Points

- **High level of awareness of the Potential Storm Surge Flooding map**
- **High rate of use and sharing in high-impact areas**
- **Lack of clarity of probabilistic basis for map**
- **Requests for higher resolution and greater zooming capacity**
- **Some remaining confusion among users about AGL; some requests for more distinction between 1-foot and 3-foot levels**

Recommendations/Next Steps

- Continued outreach and education, particularly with EM community, to ensure understanding and awareness of the probabilistic basis of the map, the “above ground” measurement, and the rationale for the level of zoom capability.
 - Consider updating the educational tip sheets developed several years ago based on the experiences and questions that have arisen during actual events. Consider multiple mechanisms for distributing this information (email, briefings, social media, etc.).
 - Consider the development of “case studies” explaining how WFOs with experience in using the map have successfully shared it with partners and the public, as well as typical questions or concerns that have arisen and how WFOs or the NHC have addressed these issues.
- Provide a 1-in-10 explanation on the map, using a larger, easy-to-read font. Consider using “reasonable worst-case” language in text on map.
- Consider changing the term “intertidal” to marsh or wetland; “intertidal” is not a common term for the public. Consider potential issues with surge levels on the map when toggling this layer on and off.

Key Findings – Experimental Storm Surge Watch/Warning and Prototype Map

ERG explored the awareness and use of the experimental Storm Surge Watch/Warning prototype map with interviewees, probing for opinions about the potential impact of the product on planning, preparedness, and risk perception, as well as for specific feedback on the threshold level, the use of the storm surge watch/warning with other NWS watches/warnings, and the use of the prototype map in relation to the Potential Storm Surge Flooding map. The findings are as follows:

- **Awareness.** All but two of the 19 interviewees were aware of the experimental storm surge watch/warning.

- **Use and Sharing.** Most of the Florida-based interviewees used or shared the map. Both Florida WFOs and three out of four Florida EMs used/shared it. Two out of four media respondents (national media and NJ media) used it, with the other two stating that they would use it in the future. The Virginia broadcaster was more apt to use the map only for either a “Sandy-like storm” or for areas where a tropical storm/hurricane watch/warning was not already in effect. Both broadcasters that didn’t use the map during Hermine mentioned there were already too many NWS products. Other reasons given for not using the map included lack of familiarity with the product and absence of actions or triggers tied to a storm surge watch/warning. Some thought that conditions in their area did not warrant using the map or that the tropical storm/hurricane warning in effect adequately conveyed the threat.

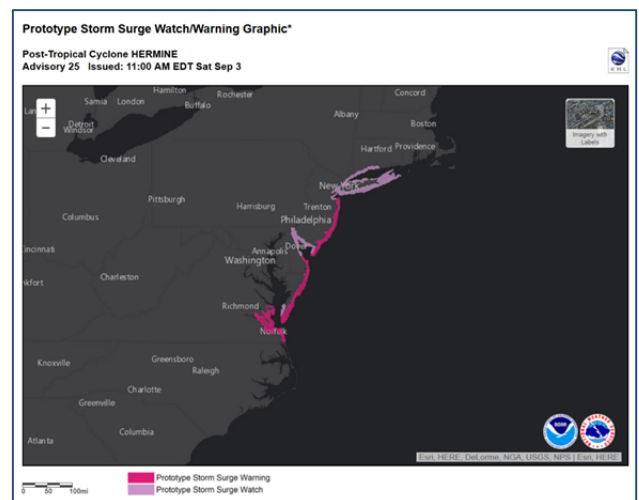


Figure 3. One of the prototype storm surge watch/warning maps issued during Hermine

- **Threshold.** For some interviewees, it was not clear what threshold was being used to generate the map. One media interviewee stated that sophisticated users asked him what the threshold was because it wasn't apparent on the map. There were also mixed opinions on the three-foot threshold. In Virginia, one EM stated that "one foot is significant for some of our areas, but not others." Another stated: "I am not a fan of the generalized three-foot level. There may be places where even one foot may be a problem." On the other hand, in some areas, interviewees felt the three-foot threshold was too low to be considered life-threatening. One individual stated that for his area (coastal Virginia), "four to five feet is truly life-threatening." Some were concerned that the watch/warning was just too broad to be useful. One stated: "When your entire coastline is highlighted with a warning, that's 28 miles of coastline for us. It's a problem because we do very targeted evacuations."
- **Inconsistencies between NWS products.** One interviewee noted there is a discrepancy in messaging among different NWS products. The Hurricane Local Statement (HLS)/local Hurricane Threat and Impact (HTI) graphic characterizes three feet of storm surge as "moderate," the coastal flood warnings characterize three feet as "major," and the storm surge watch/warning characterizes three feet of flooding as "life threatening."
- **Potential perception issues with coastal flood products.** Another potential obstacle going forward is that a WFO cannot have a coastal flood warning next to a storm surge warning, so by policy, if conditions warranted it, the WFO would have to drop any coastal flood warnings in effect and put up a storm surge warning instead. One forecaster said that canceling a warning can be confusing and potentially send the wrong message to the public (i.e., people can infer that they are no longer in danger if a warning is canceled).
- **Use of the Potential Storm Surge Flooding map and the watch/warning map.** Most interviewees did not think there was confusion on their part or the part of the public between the two maps. One media interviewee said he showed both maps together to show the complete picture.

Key Points

- **High level of awareness of the experimental storm surge watch/warning.**
- **Most interviewees thought it was a valuable addition to the suite of tropical products.**
- **Support for the map component as providing a visual easily shared and understood by the public.**
- **Not shared where it was not considered relevant for the storm conditions in their areas, especially as Hermine (and, in some cases, Matthew) progressed.**
- **Operationally, some WFOs are concerned about potential messaging conflicts, particularly in connection to other NWS products.**

Recommendations/Next Steps

- Clearly explain the threshold for the watch/warning on the map. Consider developing protocols to allow WFOs to tailor the threshold to their area.
- Address inconsistencies in how three feet of storm surge is characterized across different NWS products. Further consider potential operational/messaging issues with the introduction of the new watch/warning to the suite of existing NWS products.
- Develop communication messaging recommendations for the watch/warning map to clearly explain the map. (See Figure 4 for how one WFO presented the map on social media.)

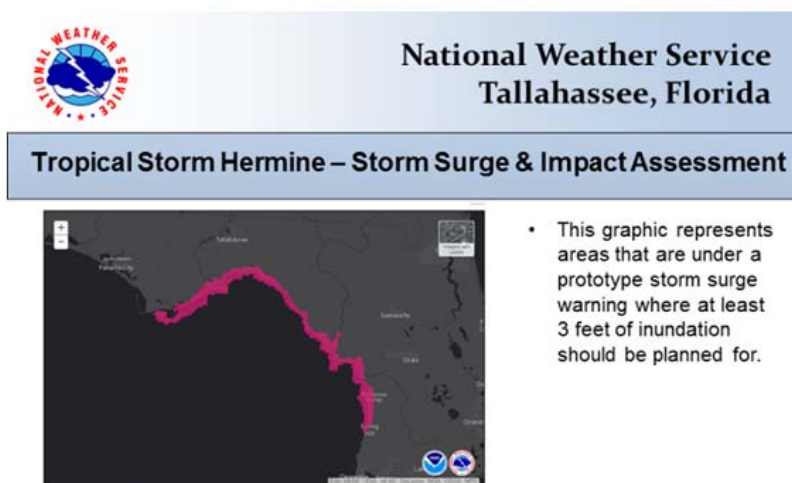


Figure 4. Text description accompanying map by Tallahassee WFO.

Many of these issues and concerns of EMs and the media will be addressed with further experience. However, a need for further education and outreach is indicated by this exploratory research. It should be noted that this work does not assess how the public may interpret and use the product.

Key Findings – Extratropical and Post-Tropical Storms

ERG also asked a series of questions (see Appendix A) about communication needs and issues surrounding ET and PT storms with interviewees in Virginia and New Jersey. Interviewees expressed that these storms can present significant tidal and surge threats to their coastlines (with impacts persisting over many tidal cycles) and that there is an “information gap” that needs to be filled—both in finding the information they need to assess the danger and in communicating this information to the public. Many interviewees noted that they go to several sources to get the meteorological information they need and that often these discussions are quite technical.

A related issue is the nomenclature to use when communicating about these storms to the public. While many of the interviewees stated that it’s important for *them* to know what kind of storm they are facing (e.g., tropical, post-tropical, extratropical), these are not terms that resonate with the public. Terms that resonate with the public include “tidal events” and “Nor’easters.” Several interviewees also noted that “hurricane” (and to some degree, tropical storm) is the term most likely to get people’s attention, yet these terms don’t always characterize the threats associated with ET/PT storms. Therefore, using these terms can be confusing to people in the mid-Atlantic and Northeast. Some EMs also noted that they will sometimes stray away from the NHC/NWS terminology and use whatever terms the media is using so that the public can relate to the information. Some noted they will continue to use the NHC/NWS terminology but encourage people not to focus on the terms but the potential impacts.

There was unanimous support among the interviewees for the NHC to continue issuing warnings for storms transitioning from a tropical cyclone. One media representative stated, “In Irene, we had the hurricane warning, but nothing happened. Then, in Sandy they [NHC] did not issue a hurricane warning, but we got it. This led to mixed messages and confused the public. In Hermine, it helped that NHC continued to issue the products. There is a concern for a false alarm because we prepared for Hermine and didn’t get hit, but that’s human nature.”

There was also near unanimous support for NWS to develop a suite of storm surge products (like the tropical products) for ET. EMs again mentioned the need for more detailed information or zoom in capacity. One media representative stated that “Visual maps and graphics are very helpful for public communication.”

Key Points

- **Recognition of an information gap for assessing and communicating the threat of ET storms.**
- **High level of support for NHC to continue issuance of tropical storm and hurricane watches/warnings and other tropical products (public advisories, maps, etc.) after a storm technically transitions from tropical status.**
- **High level of support for NWS to provide storm surge products (i.e., watch/warning and potential flooding maps) like the suite of products that have been developed for tropical cyclones. No consensus on how to label these products in a way that will appropriately convey the threat and not confuse the public.**

Recommendations/Next Steps

- Consider the development of a storm surge product suite for ET storms.
- Continued research into the nomenclature to use when referring to these storms.

Key Findings - Social Media Monitoring

During Hermine, many partners shared the Potential Storm Surge Flooding map and prototype storm surge watch/warning map; some also shared static images of the maps focused on a geographic area. Tracking images (such as these maps) across the web is a labor-intensive endeavor that is not easily done via simple searches. Therefore, ERG instead searched Twitter for conversations relating to storm surge and related equivalents (e.g., #stormsurge) throughout the duration of Hermine's lifecycle. See Appendix B for a complete summary of this research.

Key Points

- 1,122 tweets directly related to Hermine and surge.
- 106 unique users sent tweets.
- 189 tweets (17%) mentioned or linked to one or both of the NWS storm surge maps.
 - 35 tweets affiliated with NHC.
 - Of the remaining 154 tweets, 63 (41%) shared the map(s).
- 25 users were "prominent voices" with 10,000+ followers, including major media outlets reaching hundreds of thousands of people.

Recommendations/Next Steps

- Consider additional social media analysis in the future when key products, like the Potential Storm Surge Flooding map, are used during real-time events. Social media analysis provides relatively inexpensive corroborating evidence for more in-depth research on the way that NWS customers use and share its products and information.

Conclusion and Next Steps

Many of the issues and concerns raised by the interviewees during this research will likely be addressed with further experience and familiarity with the products. However, this exploratory research does reveal a need for further education and outreach about the storm surge products and to address potential operational/messaging conflicts between NWS products. It also demonstrates a strong support for the NWS to develop a suite of storm surge products for ET storms to help fill a perceived information gap.

Appendix A – Interview Script

General/Overview

1. What actions, if any, did your organization take in response to the threat from Hermine?
2. Where did you get your storm surge forecast information during the event? [PROBE for NHC, WFO, private vendors, cable and local TV, as appropriate]

Storm Surge Flooding Map

3. Did you see NHC Potential Storm Surge Flooding Map at any time during the Hermine response? [Show example] [If no, skip to Q 9.]
 - Where did you see the map? [Probe for more than one place]
 - When did you access it?
 - How often did you access it?
4. If you can recall, what was your initial reaction to the flooding levels on the map?
 - Was there any confusion related to the levels being based on height above ground? Did the levels seem realistic to you? Explain why or why not.
5. Given what transpired with the storm, what was your reaction to the flooding levels on the map?
 - [If needed] do you think the potential levels indicated on the map were appropriate?
6. How did you use the map as Hermine threatened your area? [PROBE for assessing the threat, making preparedness decisions, making evacuation decisions, posting it on a website, using it in social media, communicating with authorities, communicating with the public, discussions with colleagues, etc.]
 - Who, if anyone, did you share it with?
 - [For **broadcast meteorologists**]: Did you show it on air?
 - Did you alter it before sharing it? [If so, PROBE for why they did this and ask if they can send copies.]
 - Did you encounter any difficulties in using or sharing the map?
 - Please describe any feedback you received.
7. In general, what do you think about the addition of this map to the NHC suite of products?

Prototype Storm Surge Watch/Warning Graphic

The NHC and NWS WFOs issued a Prototype Storm Surge Watch/Warning graphic on an experimental basis during Hermine.

8. Were you aware of this? [If not, skip to Q. 15]. If so, how did you learn about the map?
9. Did you use the surge watch/warning? If so, please explain how.

- [PROBE for whether the issuance of the surge watch/warning affected their assessment of the threat, their internal decision making, or their external communication.]
10. How did you use the surge watch/warning in relation to the TS/hurricane watch/warning?
 11. Did you share the surge watch/warning map with anyone?
 - [For **broadcast meteorologists**] Did you use it on air?
 - If so, did you alter the map? [If so, PROBE for why they did this and ask if they can send copies.]
 12. Did you receive any feedback on the surge watch/warning?
 - Did you receive any feedback on the criteria level? If so, what were the concerns?
 - Was there any confusion related to the levels being based on height above ground?
 13. In general, what do you think about the addition of this map to the NHC suite of products?
-

Transitional Storms (for VA/NJ only; not as relevant for Florida)

14. What type of storm was Hermine to you? In other words, how did you refer to Hermine in your communication messages?
15. When you receive storm surge forecast information, how important to you is it to know whether it's being generated by a tropical storm, hurricane, extratropical storm, or post-tropical storm? [For broadcasters, PROBE for if they use these different terms in their broadcasts/on the web and if they define them for people. Also, PROBE for if they get questions from their viewers on the nomenclature.]
16. Were you aware that the NHC continued issuing tropical storm products (e.g., watches/warnings and maps) after Hermine transitioned to a post-tropical storm?
17. How do you feel about this? [PROBE for whether continuing the tropical product suite is helpful or confusing]
18. Would you be interested in a similar suite of storm surge products, that is the potential flooding map the watch/warning, for transitional storms (e.g., post-tropical, extra-tropical) in the future?

General

19. Is there anything further you'd like to communicate to the NWS about the Hermine forecast communication process?
20. Is there someone else you feel would be beneficial to interview regarding use of these products during Hermine?

Appendix B: Social Media Monitoring Findings

Background

ERG searched Twitter for conversations related to “storm surge” throughout the duration of Hermine’s life cycle. ERG was particularly interested in determining a rough count of how many users shared the National Hurricane Center’s (NHC’s) prototype storm surge watch/warning map and potential storm surge flooding map. During the search, ERG catalogued high-level statistics, including number of tweets, peak periods, and prominent voices. We also tracked how many users shared a static image taken from the maps versus how many simply retweeted NHC or linked to NHC’s web pages for the maps. This measure gave us a rough proxy of social media conversations from people who engaged on a deeper level with the maps.

Methodology

Originally, ERG used Google’s advanced search features to search Twitter for conversations related to storm surge from August 28, 2016, to September 6, 2016 (Hermine’s life cycle), with the following criteria:

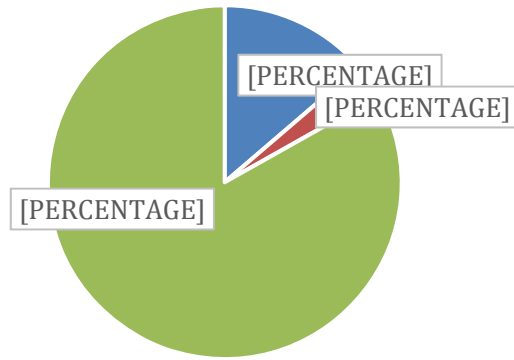
- All these words: “storm surge” OR “surge”
- Language: English
- Site or domain: twitter.com
- Date range: 8/28/2016 to 9/6/2016

However, a Google search only yielded approximately 180 results, more than half of which were unrelated to storm surge (or even Hermine) or fell outside of the specific date range. Given these limitations, we instead focused on searching Twitter, using the following criteria:

- “storm surge” AND “Hermine”
- Language: English
- Since: 2016-08-28 until: 2016-09-06

This search yielded roughly 1,122 tweets directly related to Hermine during the storm’s life cycle. Of these results, 189 tweets from 106 unique users mentioned or linked to the NHC’s maps. Of the 189 tweets that mention the maps, 35 came from users affiliated with the NHC (e.g., NHC Atlantic Ops, NHC Director, NWS weather forecast offices). In presenting the results, ERG mostly excluded these NHC-affiliated tweets, instead focusing on the 154 tweets from users not affiliated with the NHC.

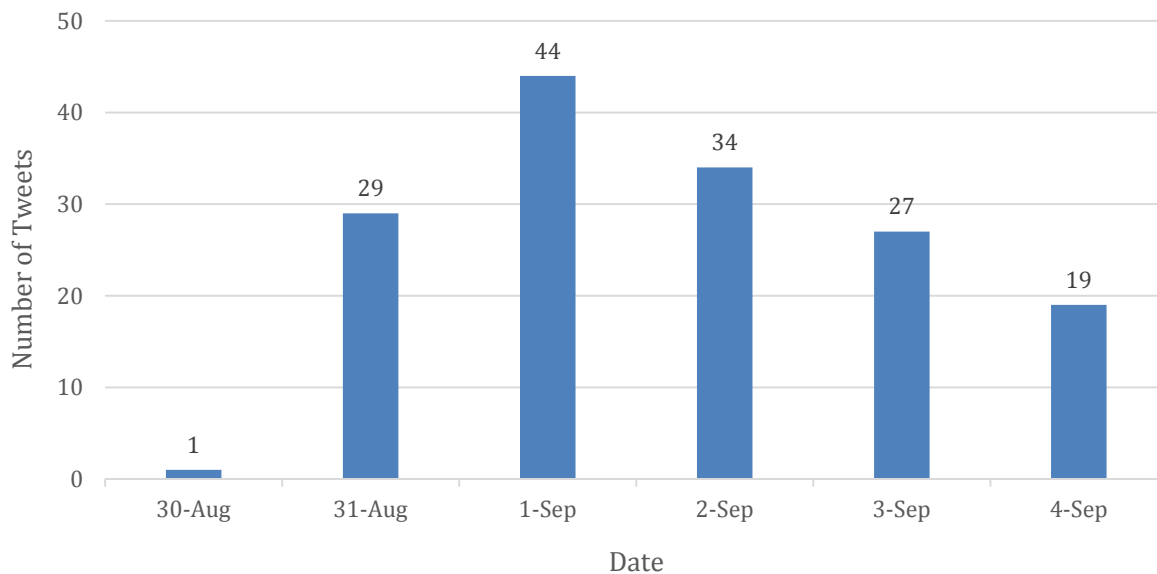
Tweets About Storm Surge During Hermine



- Mention maps (not affiliated with NHC/NWS)
- Mention maps (affiliated with NHC/NWS)
- Don't mention maps

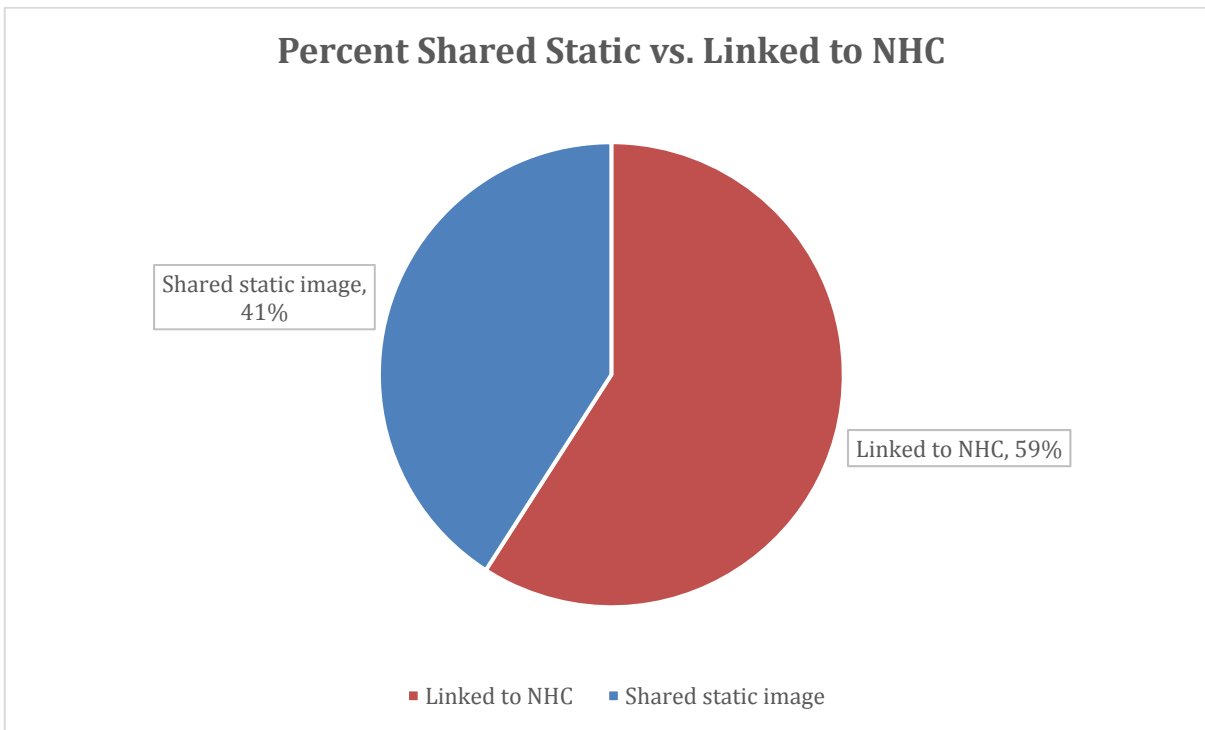
- Total: 1,122 tweets
- Don't mention maps: 933 tweets (83 percent)
- Mention maps (users not affiliated with NHC/NWS): 154 tweets (14 percent)
- Mention maps (users affiliated with NHC/NWS): 35 tweets (3 percent)

Peak Periods for Tweets That Mention Maps



September 1 was the peak period for tweets mentioning the maps (from users not affiliated with NHC). This is unsurprising since Hermine made landfall on September 2, 2016 (second highest peak period).

Percent Shared Static vs. Linked to NHC



Of the 154 tweets from users not affiliated with NHC, 63 tweets (or 41 percent) shared a static version of the maps, indicating a deeper level of engagement with the products than the 91 tweets (59 percent) that simply linked to an NHC page (Note: retweets of NHC were included in this “Linked to NHC” category).

ERG also catalogued “prominent voices” who tweeted about the maps, flagging those users who have 10,000 Twitter followers or more. Table 1 below provides a detailed breakdown of these users (with links to their Twitter accounts), indicating whether they shared the graphic on their own Twitter page or linked to the NHC, the date they tweeted, and their number of followers. These users include news agencies, broadcast meteorologists, emergency management officials, storm chasers, severe weather information websites, and more.

Table 1. Prominent Voices (> 10,000 Twitter followers)

Who	Description	Date	Shared Graphic	Linked to NHC	Followers
CBC News Alerts	Canadian-based media company	9/2/2016	✓		900,000
James Spann	Meteorologist, ABC Birmingham and host of Weather Brains podcast	9/1/2016	✓		302,000
Alex Howard	Senior analyst, Sunlight Foundation	9/1/2016	✓		258,000
Texas Storm Chasers	Storm chasers	9/2/2016	✓		177,000
The Weatherboy	Media company	9/4/2016	✓		166,000
Media Center	Indonesian media site	9/1/2016	✓		85,200
USA Today Weather	Major U.S. media company	9/2/2016	✓		82,200
Eric Fisher	Chief meteorologist, CBS Boston	9/3/2016	✓		81,900
TornadoTitans.com	Storm chasers	9/1/2016		✓	60,400
Craig Fugate	FEMA Administrator	9/3/2016		✓	57,600
Brad Panovich	Chief meteorologist, NBC Charlotte	9/3/2016	✓		53,200
Eric Holthaus	Meteorologist, Slate	9/2/2016	✓		49,800
Stu Ostro	Meteorologist (Weather Channel)	8/31/2016	✓		39,200
Ian Livingston	Lead forecaster for Washington Post's Capital Weather Gang	9/2/2016	✓		36,800
Met Office Storms	UK weather agency	9/1/2016	✓		32,800
28storms.com	News/media website	9/1/2016	✓		30,600
Greg Postel	Hurricane and storm specialist (Weather Channel)	9/2/2016	✓		23,100
MyFWC	Florida Fish & Wildlife Conservation Commission	8/31/2016		✓	19,600
AtlanticCity911	News/media website	9/2/2016	✓		17,900
Matt Laubhan, CBM	Chief meteorologist, WTVA	9/1/2016	✓		16,700

<u>Gary Szatkowski</u>	Meteorologist (former WCM in Mt. Holly WFO)	9/2/2016		✓	16,300
<u>The Storm Report</u>	Media company	9/3/2016	✓		13,600
<u>Michael Hook</u>	Storm chaser and forecaster, radio personality	8/31/2016	✓		13,500
<u>Florida SERT</u>	The Florida Division of Emergency Management	8/31/2016		✓	11,700
<u>Wes Wyatt</u>	Meteorologist, Fox News Birmingham	9/3/2016		✓	11,700

Appendix C – Summaries of Interviews

Florida and National Emergency Managers – Summary of Key Points					
Respondent Type	Federal	EM -Local FL	EM – Local FL	EM – Local FL	EM- Local FL
Actions and source(s)	<p>Actions: Monitored ahead of time as it was a long-track hurricane with potential to affect our area around Labor Day.</p> <p>Sources: NHC, Local WFO</p>	<p>Actions: Monitored ahead of time and got out decision points 3-5 day in advance, stayed in contact with local WFO.</p> <p>Sources: NHC, Local WFO, Crown Weather</p>	<p>Actions: Started monitoring early and communicated to the public actively; activated EOC but was short-lived.</p> <p>Sources: Local WFO, NHC website: used the p-surge model very</p>	<p>Actions: Started preparations when we found out Hermine is going to affect our area.</p> <p>Sources: NWS WFO, state FL calls that included briefings from NHC about projection and other data needs at</p>	<p>Actions: EOC throttle activation</p> <p>Sources: Two local WFOs, NHC website, Hurrevac, weather stations along the coastline</p>
SS Flooding Map: Access and Use	<p>Saw it: Yes Used it: Yes Shared it: Yes, with FEMA. Not just to determine which areas will be exposed but also to determine how many people will be affected, how much flooding will occur, etc. We overlay the flooding data with existing census data to determine exposure and vulnerability. Altered it: No</p>	<p>Saw it: Yes, in state or local office's briefing package Used it: No, because product is new Shared it: No Altered it: No</p>	<p>Saw it: Yes Used it: Yes, EOC partner briefings, Facebook, public/sheriff EOC alert form, Spanish speaking stations, County gov's website, TV crawl, message boards at each entrance to our coast line Shared it: Yes, emailed to partners Altered it: No, but wish it had put more detailed explanation.</p>	<p>Saw it: Yes Used it: To declare a local state of emergency and issue mandatory evacuation orders for areas in the map Shared it: Yes, EM support functions and local govt officials, social media Altered it: No</p>	<p>Saw it: Yes Used it: Yes Shared it: Yes, gave it to public officials, used it in social media (Facebook more than Twitter), on website Altered it: Train EMs to add "88" after AGL. Give values in MSL to citizens so they can compare with their surge/flood markers and poles.</p>
SS Flooding Map: Reaction and confusion about levels	<p>#levels High-levels 8 to 9 feet above ground is hard to determine so local officials and decision makers should be involved. #deterministic The map should clearly say that is what could happen, NOT what is expected.</p>	<p>#detail Not sure what is the intent of the map. Is it for the public or for decision makers? For the public, it's not detailed enough to tell where the different inundation levels breaks are.</p>	<p>#AGL Haven't achieved a level of clarity with what aboveground really means. People may not know that elevation has already been accounted for #levels Levels seemed realistic, but compared the levels with historical data and data from other SS products that were in effect.</p>		<p>#design Colors got attention right away #AGL Reasonable and works for us and our partners. We train EMs to add "88" after AGL because we have citizens who have access to storm surge markers. We give them the levels in MSL so they can use the info to get an idea of flooding probability. We also add images of those poles so the citizens have a point of reference when they look at the map. #levels Levels were #accurate as well.</p>

Florida and National Emergency Managers - Summary of Key Points

Respondent Type	Federal	EM -Local FL	EM - Local FL	EM - Local FL	EM- Local FL
SS Flooding: Feedback from Partners or General Feedback	<p>#deterministic The map is very deterministic looking, but is probabilistic which causes confusion. Also, this map can easily be confused as a forecast, instead of a risk/threat exposure map.</p>	<p>#detail Map tells you there will be a certain level of flooding, but does not tell you WHERE. You can't zoom into to a point where it matters. It's not detailed enough to provide large amount of information I need. I still make my decisions based on the storm tracks.</p>	<p>#accuracy Support the idea because I could verify the accuracy of the forecast with other products. It helped reinforce the message. #design Need better quality map. #explanation Add explanation on the map. If it's already on the map, we don't have to write it on</p>	<p>#levels Levels appear to appropriate and ended up being accurate (based on MOMs and MEOWS).</p>	Yes, helpful
Prototype SS Graphic: Access and Use	<p>Saw it: Yes Used it: Yes, but we were already prepared by the time watches and warnings were out, esp. for Matthew Shared it: Yes, internally with FEMA officials Altered it: Took the SS warning (to capture area affected) and overlaid with the SS forecast (to convey how much inundation will occur).</p>	<p>Saw it: Yes Used it: No, we don't have any triggers or actions tied to these products in terms of decision points yet. #trigger Shared it: No Altered it: N/A</p>	<p>Saw it: Yes, but our actions were already triggered by the hurricane watches and warnings so did not use it or share it. #trigger Used it: No Shared it: No Altered it: N/A</p>	<p>Saw it: Yes Used it: Yes Shared it: Yes, in briefings Altered it: No</p>	<p>Saw it: Yes, NHC webinar, then website Used it: Yes, in briefings Share it - Yes, with public officials Alter it: Yes</p>
Prototype SS Graphic: Use w/ TS/hurricane Products	<p>#no confusion Yes, I think people differentiated between the two. People are more focused on the specific hazards (rainfall, storm surge, etc.) and not the products.</p>	<p>No calls or complaints but don't think the public really knows the difference. # deterministic SS flooding map shows the worst-case scenario, which is a probabilistic graphic; however, it can easily be confused with the SS watch/warning products that are deterministic. #local To resolve the difference in the two, NHC needs to allow the local WFO offices to be more involved.</p>	N/A	<p>People may not understand the difference, but we as #no confusion EMs do and we try to educate, but didn't hear any confusion from anyone.</p>	<p>The two types watches and warnings coincided for Hermine, so not too much discussion or confusion among public officials or the citizens. #no confusion</p>

Florida and National Emergency Managers - Summary of Key Points

Respondent Type	Federal	EM -Local FL	EM - Local FL	EM - Local FL	EM- Local FL
Prototype SS Graphic: Confusion About Criteria Levels	#levels Internally, for us, the forecast did not match up with the reality (i.e. local officials not evacuating).	#levels I am not a fan of the generalized 3-foot level. There may be places where even 1-foot may be a problem. 3-foot might be a problem in some areas, but not in others. Keep this map but give the decision makers the ability to adjust or add levels based on local threat levels. Three feet level is a just a broad brush approach that does not account for local nuances.	N/A	#levels Levels seemed reasonable.	No questions
Prototype SS Graphic: Feedback	#accuracy Data doesn't always coincide with the forecast itself. In general, NHC should consider who is receiving this product, is it the EMs or the public.		Probably a good idea because it separates areas that could be impacted by surge but not wind. However, in our area, we usually get surge and wind together.	yes, good idea.	Yes, useful. Much better visually. We cannot have enough tools in our toolbox to communicate to the public so this is a good idea.

New Jersey and Virginia Emergency Managers – Summary of Key Points

Respondent Type	EM -Local NJ	EM- Local NJ	EM- Local VA	EM – Local NJ	EM- State VA	EM – Local VA
Actions and Source(s)	<p>Actions: Monitored NHC, only acted if communication from local WFO. Attended briefing calls with local WFO and State EO</p> <p>Sources: NHC: experimental map, SLOSH model, Hurrevac</p>	<p>Actions: Limited activation of EOC</p> <p>Sources: NHC, local NWS USGS tide gauges</p>	<p>Actions: Terminated some city activities on Friday evening; looked at closing city facilities, rec centers, museums on Saturday; worked with colleges to reschedule football games; looked at areas for parking on higher ground; kept track of tide and closed major flood gates.</p> <p>Sources: Local WFO-- create storm-specific web page, general EM briefing page; emails, phone calls, conference calls</p>	<p>Actions: For Hermine, proactively monitored storm track since Sept 2, governor issued emergency order, prepared to position staff and coordinate evacuations, but nothing was employed. Not affected by Matthew</p> <p>Sources: In contact with Local WFO; monitored NHC website</p>	<p>Actions: For Hermine, monitored storm in advance, specifically, rainfall, coastal flooding, winds, beach conditions, forecast confidence levels, etc. Prepared to activate EOC 5 days in advance as per protocol for tropical/hurricane events by working with state agencies (DOT, agriculture, etc.) and volunteers. Matthew was a "nonevent"</p> <p>Sources: Local NWS, NHC Stevens Institute of Technology</p>	<p>Actions: Weather briefs go out to operational email distribution group. As storm gets closer, run GIS models--take all the MEOWS and create composite, then provide that as web service on a web map. Also, track FTP site for P-surge downloads.</p> <p>Sources: Local WFO (Wakefield) NHC, Hurrevac</p>
SS Flooding Map: Access and Use	<p>Saw it: Yes, several times</p> <p>Shared it: Yes, with county and local govt</p> <p>Altered it: No</p> <p>Altered it: N/A</p>	<p>Saw it: Yes</p> <p>Used it: Not really. To calculate surge, we combine USGS tide system and wind forecast</p> <p>Shared it: N/A</p> <p>Altered it: N/A</p>	<p>Saw it: Yes (mostly used P-surge map)</p> <p>Used it: Not really; only looked at it a couple of times</p> <p>Shared it: N/A</p> <p>Altered it: N/A</p>	<p>Saw it: Yes</p> <p>Used it: No</p> <p>Shared it: N/A</p> <p>Altered it: N/A</p>	<p>Saw it: Yes</p> <p>Used it: No, due to accuracy concerns in NHC's information</p> <p>Shared it: N/A</p> <p>Altered it: N/A</p>	<p>Saw it: Yes</p> <p>Used it: No</p> <p>Shared it: N/A</p> <p>Altered it: N/A</p>
SS Flooding Map: Reaction and confusion about levels	<p>#levels Levels seemed realistic. #No confusion from colleagues or the public.</p>	<p>#AGL Only used to gauge the "danger" areas so we can make evacuation decisions. There was confusion a couple of years ago. For the average person, the above ground level makes sense.</p> <p>#no confusion</p>	<p>#design Zoomed in and had issues with pixilation, so relied more on local product (TITAN).</p>	<p>#AGL #No confusion, appreciate the new levels</p> <p>#accuracy NHC's forecast and the local weather information did not add up, causing #confusion and making it challenging to make decisions about shelters and volunteers.</p>	<p>#levels #accuracy NHC's forecasted water level was "astoundingly high" than the actual measurements and conditions received from other information sources.</p>	<p>#levels Don't like it; create our own. Difference between 1 foot and 3 feet in our city is massive. The gap is too significant.</p> <p>#design Also, we use NHC data to create a higher-resolution, localized product.</p> <p>#local Change the elevation levels based on region.</p>

New Jersey and Virginia Emergency Managers – Summary of Key Points

Respondent Type	EM -Local NJ	EM- Local NJ	EM- Local VA	EM – Local NJ	EM- State VA	EM – Local VA
SS Flooding: Feedback from Partners or General Feedback	<p>Yes, helpful in the future.</p> <p>Would have been useful for Sandy.</p> <p>#design From a safety aspect, it would be helpful to get another click or zoom level.</p> <p>#detail During Sandy, we had people who refused to evacuate. It could have been useful to have the map at a detailed level to encourage people to evacuate.</p> <p>#disclaimers: The repeated appearance of disclaimers. "It seemed like they were more interested in disclaiming the product instead of putting it out there."</p> <p>Annoying when limited time to make decisions immediately.</p>	<p>Support of the idea, but not enough #detail for our county to be useful.</p> <p>#detail: It was too broad and general for us. We used the map in a limited way for Hermine. We could have used it more during Sandy.</p>	<p>I'm excited about this map--provides clarity and more #details about what's coming. More value to EOC than we've had with SLOSH and other products. Depth of water is much better than what we have now.</p>	<p>Area very vulnerable to coastal flooding; this is an important tool.</p>	N/A	N/A
Prototype SS Graphic: Access and Use	<p>Saw it: Yes</p> <p>Used it: No, wasn't relevant by the time it got to our area, but would have used it.</p> <p>Shared it: N/A</p> <p>Altered it: NA</p>	<p>Saw it: No.</p> <p>Used it: N/A</p> <p>Shared it: N/A</p> <p>Altered it: NA</p>	<p>Saw it: Yes</p> <p>Used it: Pretty sure I did in EOC briefings (but can't remember)</p> <p>Shared it: In briefings</p> <p>Altered it: NA</p>	<p>Saw it: No, aware area was under SS warning, but not aware of this map. Used it: N/A</p> <p>Shared it: N/A</p> <p>Altered it: NA</p>	<p>Saw it: Yes</p> <p>Used it: No because forecast confidence level was low and forecast information did not match conditions on the ground. #accuracy Did not want to cause false alarm for the public.</p> <p>Used it: N/A</p> <p>Shared it: N/A</p> <p>Altered it: NA</p>	<p>Saw it: Yes</p> <p>Used it: No (but do use the text information; GIS looks at data for watches/warnings)</p> <p>Shared it: N/A</p> <p>Altered it: NA</p>
Prototype SS Graphic: Use w/	N/A	N/A	For SS WW, I was just figuring out where to put it in our checklist of	Just use TS/hurricane watch warning products because	N/A	N/A

New Jersey and Virginia Emergency Managers – Summary of Key Points

Respondent Type	EM -Local NJ	EM- Local NJ	EM- Local VA	EM – Local NJ	EM- State VA	EM – Local VA
TS/hurricane Products			activities (i.e., once SS WW occurs, what action does that #trigger?). TS triggers actions. SS might trigger additional actions; that would be institutionalized.	most people are used to them.		
Prototype SS Graphic: Confusion About Criteria Levels	N/A	N/A		N/A	#levels The 3-foot level intervals make sense to us and is a good threshold for our area. Add the levels clearly on the map so people can make evacuation decisions.	
Prototype SS Graphic: Feedback	Helpful in the future. Many people still rely on radio and tv for weather info, so we need to get them out as soon as possible. Having NWS logo gives message credibility.	N/A	Appreciate NHC constantly tries to improve not only forecast, but packaging forecast in an easy-to-understand way. Would like to know what info EM community can provide to NHC for ground truthing/confirming forecast.	Would use for planning and educating the local municipal coordinators who communicate/educate the public via their local contacts. On social media, we would just educate/communicate by sharing NHC tweets.	Appreciate the ability to communicate information in a #visual format because "people don't read these days."	#levels Not useful for us because 1 foot is significant for some of our areas, but not others. When your entire coastline is highlighted with a warning, that's 28 miles of coastline for us. It's a problem because we do very targeted evacuations.
Transitional Storms: Terminology Used for Hermine	Follow NHC's lead on what to call/name and rename it.	[Hermine] was a nonevent, up until the day before. We just didn't get any effect of it.	Tidal event. Framed it as "stay off the roads; blocking certain roads"	We call it whatever NHC calls it, "they have the weather degrees, we don't."	For decision making, referred TS but told the command to think of it and treat it like a #Nor'easter as the impacts are similar. But overall, try to stay consistent with the NWS or NHC to the extent possible.	Referred to as tropical storm. Can't throw word "hurricane" around too freely; don't want people to relate that experience with a hurricane.
Transitional Storms: Terminology General	Hurricane carries a lot of weight. Tropical storm gets their attention but not always.	The terms all important. But we are moving a lot of people and resources and need more info for evacuation decisions and messaging that is not all covered by this map or product suite. We	For me, the difference is in hurricane and #Nor'easter Need to know stacking tides for Nor'easter vs. one to two tide cycles for hurricane. Indifferent. Sometimes if not named storm, people complain about why not. But at same time, I feel like if have good relationship with local office, that's communicated	Terms are not important for internal decision making, but they matter to the public.	Sometimes stray away from the NHC/NWS terminology and go with what the media is calling it so the public can relate it to. For example, used the hashtag JonasWinterStorm because that's what the governor and media called it. Added links or	Group "tropical storm" and "hurricane" together, and "ET and PT" together. Communicating transition very important in our city because impacts are different. Nor'easters decimate our city. #public perception #"Nor'easter" term resonates with

New Jersey and Virginia Emergency Managers – Summary of Key Points

Respondent Type	EM -Local NJ	EM- Local NJ	EM- Local VA	EM – Local NJ	EM- State VA	EM – Local VA
		understand the terms, but the public doesn't know what it means when a storm gets downgraded. Even some of our public officials don't understand these terms and cause #confusion.	regardless of whether storm is named.		information from/to the NHC/NWS information. Impacts most important.	public; ET and PT do not communicate anything in our community. #confusion
Transitional Storms: Continuation of TS Products	Yes, NHC should continue issuing products. We are aware that NHC continued issuing products for Hermine. It would have been very helpful for Sandy.	Yes, for EMs it's helpful for NHC to continue issuing TS products.	That's good	Not aware, but yes, NHC should continue issuing.	In support of NHC continuing to issue because area is very vulnerable to ET systems.	Support because there's nothing else. Value in the information they provide once storm transitions because it's a source of information.
Transitional Storms: Feedback	N/A	#design Yes, useful but current products are still pretty broad. Need zoom-in capacity or contain more local information to make timely evacuation decisions. Other Activities: We use another Google-map based tool and techtometry-based system (gives elevation above sea level) for visualize threats as a map. You can bring up your area at a street level and overlay the flooding data to get a better sense of	N/A	#design Yes, anything that has graphic is more effective to communicate - SS watch/warning and PT/ET products.	We miss the radar rainfall forecast experimental product as it increased our awareness of rainfall and coastal flooding . Our area would benefit from such a product.	Similar products would be useful for #Nor'easters that have significant tidal and surge impacts.

New Jersey and Virginia Emergency Managers – Summary of Key Points

Respondent Type	EM -Local NJ	EM- Local NJ	EM- Local VA	EM – Local NJ	EM- State VA	EM – Local VA
		flooding.				
Closing Remarks	Generally, in support of SS products. The more products like this you can give us, the safer our public will be.	N/A	Appreciate the products provided and those being improved.	N/A	<p>WFO is chronically underfunded and needs more staff support so it can effectively serve and educate the highly-populated areas in its CWA.</p> <p>Good relationship with the WFO to make sure communication is consistent. The only time there has been inconsistency was the water level forecast during Hermine.</p>	<ul style="list-style-type: none"> - Provide raw P-surge data on FTP site. - Forecasting precipitation at the local level. - We are on the line (with NC) of where transition occurs. Don't forget about #nor'easters; they are most damaging for us. We are dealing with more frequent flooding events. - More data that helps forecast the impact of #nor'easters. - Email notification service that notifies you when raw data is uploaded to FTP sites.

Media – Summary of Key Findings

Respondent Type	National Media - Large Market	Local Station - Virginia	Local Press/Radio/TV - NJ	Local Station - FL
Actions and Source(s)	<p>Actions: Positioning people to make sure there's enough coverage. Ensured there was a focus on hazards</p> <p>Sources: NHC (cone, wind speed, ET info), NWS (for local info only). We don't do anything differently in-house from what's provided from NHC so we have a consistent forecast.</p>	<p>Actions: Hermine and Matthew was esp. big in the Outer Banks area because of threat of storm surge and the over wash. High chance of roads flooding and getting washed out.</p> <p>Sources: Local WFO primary - two offices are our primary source as the ones from NHC is too general.</p>	<p>Actions: Prepared in advanced, "all the bell and whistles were rung." Disseminated tropical storm products from NHC, highlighting on SS.</p> <p>Sources: NHC, tidal gauges Compare NHC with gauges' info for real-time data.</p>	<p>Actions: Continuous coverage for 7 days, Wall-to-wall coverage for 3 days in advance. Active communication on website and social media.</p> <p>Sources: WSI, NWS chat mostly. Did NOT go to the NHC website as NWS chat would have captured the NHC information.</p>
SS Flooding Map: Access and Use	<p>Saw it: Yes Used it: Yes and No Shared it: No because too grainy and text too small; also, not dynamic Altered it: No</p>	<p>Saw it: Yes Used it: No Shared it: N/A Altered it: N/A</p> <p>Prefer to use local info</p>	<p>Saw it: Yes Used it: Yes, on social media. Shared it: Social media Altered it: Not for social media, but for TV and website by adding tidal gauge info - only the base map, not colors.</p>	<p>Saw it: Don't remember seeing it, used the map from WSI which I think pull data from NHC. WSI map had 1-foot level increments. Did not use the maps from the local WFO because for past storms, the products were too long, too cumbersome, and "meat" of the product was too hard to find.</p>
SS Flooding Map: Reaction and Confusion about Levels	<p>#accuracy #levels The levels seemed low when the very first forecast came out, but after the storm transpired, the forecast and levels seemed good.</p> <p>#AGL #Confusion regarding levels (less than it used to be, but still get questions even though the legend clearly says "above ground"). People just don't read the legend. We augment with 3D graphics to avoid confusion.</p>	N/A	<p>Conveying the SS info (inundation levels and areas) in a #visual manner is very important.</p> <p>#accuracy Based on the forecast, it was a good map that painted the worst-case scenario.</p> <p>#AGL Yes, there is #confusion because it has always been above/below mean water. We need better public communication to address this</p> <p>Don't think the public understands the 10% #exceedance level and do not have the time on air to explain it. The focus is more on the map.</p>	<p>Very hard to tell the viewers about 10 percent #exceedance, just say this is the worst-case scenario.</p> <p>#AGL #no confusion Not aware of any confusion or questions from the public.</p>

Media – Summary of Key Findings

Respondent Type	National Media – Large Market	Local Station - Virginia	Local Press/Radio/TV - NJ	Local Station - FL
	<p>Yes, absolutely useful, raised awareness and hope to see it continued</p> <p>#design Too grainy to use on air for TV. For TV, need big and bold and large text. Map is designed for the web or screen; doesn't work for TV. We just use the data and automatically drive our graphics. The text format is not dynamic so when we put the map in our software the labels shift. With new products, we have to manually build the data, unlike existing products that are easier to generate. For the folks that used it on-air, the "intertidal zone" layer caused #confusion. I like that it's grayed out, but the fact that you have the option of unchecking it/turning off the toggle results in a higher surge level (#accuracy) that gave a perception that the surge threat was higher. "Intertidal" is not a common word for the public. We called it marsh or wetland</p>	N/A	<p>Having this map is "huge" because it is a tool to #visually highlight the threats and put focus on SS not just wind categories. People still want what does it mean for my backyard, but no meteorologist can answer that.</p> <p>#AGL still some confusion; used to NAV 88; need #education</p>	<p>Initial reaction - Yes, the #levels on the WSI map were good when I first saw them.</p> <p>#accuracy The levels were accurate except for one exception. The numbers in the advisory that came out right before landfall were very low and didn't seem realistic. We did not accept it in our WSI system. This probably happened because the track probably changed, but the numbers came back up again.</p> <p>#AGL Not aware of any confusion or questions from the public about AGL, although we should have reinforced that more. #no confusion</p> <p>#exceedance BUT VERY HARD TO tell TV viewers about 10 percent exceedance. I just say this is the worst-case scenario.</p>
Prototype SS Graphic: Access and Use	<p>Saw it: Yes, NHC website Used it: Yes, a lot Shared it: spoke about it on air Altered it: Used snapshot directly from NHC but added bigger, bolder city labels. This worked because we didn't have to zoom-in or zoom out that cause labels to move.</p>	<p>Saw it: Don't remember Used it: No; already #too many products</p>	<p>Saw it: Yes Used it: Yes Shared it: Yes Altered it: Used my own base map for website and TV, used as it is for social media</p>	<p>Saw it: Yes Used it: No If I had to do it again, I would do use it. We had hurricane and TS watches and warnings already in the crawl, so I decided to not use it.</p>
Prototype SS Graphic: Use w/ TS/hurricane Products	<p>Don't think viewers confused the two.</p>	<p>Did not use it, but it's already #too many products esp. when TS/Hurricane WW already in effect</p>	<p>Used this graphic in combination with inundation map; pin them together to show complete picture. Got questions on what is a prototype; what is experimental?</p>	N/A
Prototype SS Graphic: Confusion About Criteria Levels	<p>Sophisticated users (meteorologists or sophisticated users who need to communicate products) asked about the criteria for SS watch and warning.</p>	N/A	<p>Not specifically on the criteria but on the threat based on past experience.</p>	N/A

Media – Summary of Key Findings

Respondent Type	National Media - Large Market	Local Station - Virginia	Local Press/Radio/TV - NJ	Local Station - FL
Prototype SS Graphic: Feedback	#positive The color worked and distinguished from other W and W.	Will not use it on air as there are already #too many products during an event. When there is a hurricane warning/watch noted citizens are already on high alert and know if they are in a danger zone. When there is a hurricane warning in effect, storm surge is the biggest threat. So, we talk about SS anyway, so it seems very redundant to have a separate warning or watch for it. Also over wash, beach erosion, and tidal flooding are typically more problematic for us than SS.	Raises awareness of SS threat helps to educate the public. #confusion Public confused about what prototype and experimental mean.	Did not use, but support it 100 percent for areas that don't have TS/hurricane WW. However, it becomes tricky for areas that are under TS/Hurricane WW because it could #too many products at that point.
Transitional Storms: Terminology Used	[not asked]	Hermine: Because we knew it was going to be a subtropical or ET by the time it got to our area, we focused on the rain and the wind, mostly rain. Matthew: ET. Areas affected worse than forecasted. Historic impacts.	Referred to Hermine as a tropical storm. Echoed NHC's forecast that it would be hurricane strength.	[not asked]
Transitional Storms: Terminology General	[not asked]	Yes, use all the terms on air, except ET. When using PT, will explain to viewers that the winds and rain are farther away from the center of the storm. For SS, will always communicate the strength and impact location. No questions from the viewers, surprisingly. For viewers, it's very confusing to have the term "tropical" in the warning. Much better to change to high-wind warning. #confusion	Do not use PT because the public doesn't understand what it means. And the impacts from a PT or TS are the same, so just limited terminology to TS or hurricane. #confusion	[not asked]

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Transitional Storms: Continuation of TS products	[not asked]	Only for Sandy-like storms.	In support of continuing – there was no hurricane warning for Sandy from NHC. We knew we were going to be hit, but there were products from the NHC, so we didn't have an official warning from an authoritative agency to warn the public who had just gone through false alarm from Irene, so this suite of product really solves the problem.	[not asked].
Transitional Storms: Feedback	[not asked]	Viewers are mostly #confused about watch vs. warning.	PT and ET mean a lot for the mets but the public doesn't understand these terms so these visual maps/graphics are very helpful. Hurricanes and tropical storms carry so much weight that if you use anything other than "tropical," you could risk downplaying the seriousness of a storm. Maybe a separate term that doesn't have the word tropical in it OR NHC should work with broadcast mets to do a better job at educating the public about what these terms means. #education	[not asked]

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<p>Closing Remarks</p>	<p>When the storm became post-tropical, the potential SS flooding maps became more #confusing because people wondered if NHC would continue issuing the maps. If not, who would? Technical discussions regarding surge models caused confusion and were in the weeds. Also, there was SS watch for NYC, but the flooding map did not show NYC would be flooded, which caused #confusion among the public. People were gravitating towards ET surge guidance instead of using the flooding map.</p>	<p>Local WFO did a good job at sending out flooding info, but want more wind information, such as potential peak windows - contour map. Overall, disappointed" with the #accuracy of the forecast this summer. It has been "way off." Understandable that Matthew was a difficult storm to forecast, but there was a massive difference in a short amount of time. GFF model seemed more accurate/reliable. #accuracy</p>	<p>Generally, in support of the suite of products. NHC is on right track and think storms have been handled so well over past 4-5 years. Applaud efforts to tailor products. In mid-Atlantic, Jonas was worse than Sandy; would like to see SS warning implemented for #Nor'easters.</p>	<p>The biggest problem is the cone. People see the cone shrinking and think that they are out of the danger zone.</p>

